

REMARKS

Reconsideration of this application is respectfully requested in view of the foregoing amendments and discussion presented herein.

1. Rejection of Claims 35-42.

Claims 35-42 were indicated as being rejected on the Office Action Summary sheet, but no grounds for rejection were given by the Examiner. Therefore, the Applicant respectfully submits that Claims 35-42 are patentable over the art of record.

2. Rejection of Claims 1-34 under 35 U.S.C. §103.

Claims 1-34 were rejected under 35 U.S.C. §103 as allegedly being unpatentable in view of the combined teachings of Russo et al. (U.S. No. 5,432,151) and Mao et al. (*J. Vac. Sci. Technol. A* **15**(5), Sep/Oct 1997). Of those claims, Claims 1, 2, 20, 32, 33 and 34 are independent.

(a) Claims 1 and 20-34.

In support of the rejection of Claims 1 and 20-34, the Examiner stated that the "sole difference between the instant claims and the prior art is the beam creating a biaxial orientation. However, the Mao et al reference teaches the beam treating the intermediate layers as in Russo et al will create a biaxial orientation, note page, 2687. It would have been obvious to one of ordinary skill in the art to modify the Russo et al reference by the teachings of the Mao et al reference to biaxially orientate the intermediate layer in order to enhance the properties of the superconducting layer."

In view of the Examiner's stated grounds for rejection, the Applicant respectfully submits that the Examiner has misread the pending claims and the cited references, and drawn an erroneous conclusion for the following reasons.

First, with regard to the Examiner's statement that the "sole difference between the instant [pending] claims and the prior art is the beam creating the biaxial orientation," in the interest of full disclosure the Applicant notes that such a beam is already taught by Russo et al. Both Russo et al. and Mao et al. teach Ion Beam Assisted Deposition (IBAD). There are dozens of additional examples of IBAD in the literature.

Second, unlike in the present invention, in the IBAD technology taught by Russo et al. and Mao et al., the film that is being biaxially textured is ***always*** deposited and ion bombarded ***simultaneously***.

In the present invention, however, the first step is to deposit a not-fully-oriented (typically amorphous) film. This step is followed by a ***separate*** oblique ion bombardment step. This two step, non-simultaneous process, is clearly defined in the pending independent claims by the reference therein to "a previously formed non-single-crystal structure" (Claim 1, 2, 33 and 34) and to "a previously formed non-single-crystal orientable structure" (Claim 20). The Applicant has, therefore, clearly distinguished the invention from the cited references not with respect to the beam merely creating a biaxial orientation, but by reciting that the deposition and the bombardment take place in two, distinct, non-simultaneous steps. The claims cannot be interpreted any other way, since the deposition has already taken place as specified by the use of a "previously formed... structure".

Superficially the present invention may appear to resemble the older IBAD technology taught by the cited Russo et al. and Mao et al. references. For example, similar ion energies and angles may be employed. However, the present invention is in fact a radical departure from IBAD. As one example, in IBAD film growth of YSZ (yttria-stabilized zirconia), the biaxial texture develops slowly by competitive grain growth and requires a film thickness of about 1,000 nm. In contrast, in film growth of YSZ according to the present invention, oriented crystallinity is produced by ion bombardment in the top several nanometers of the film, and may grow down into the entire film only by solid phase epitaxial growth.

In other words, in IBAD the crystallinity is formed from the bottom up, as the film grows; in the present invention, the crystallinity is formed at the top, after the film is grown. Those two processes could not be more different, and the cited combination of Russo et al. and Mao et al. does not teach, suggest or provide motivation or incentive for the two-step, non-simultaneous process recited in the Applicant's claims.

Furthermore, from the foregoing and a correct reading of the cited references, it should be clear that Mao et al. teaches *ion beam assisted deposition* (p. 2687, second column, last paragraph at bottom right of the page). Clearly, as explained in the cited

reference, bombardment takes place during deposition (p. 2688, first column, II. Experiment). Again, this is an important distinction because the Applicant does not contact the structure with a particle beam during deposition; to the contrary, in the Applicant's invention, exposure to the particle beam takes place either before or after, but not during, deposition.

As recited in each of the pending independent claims, the Applicant contacts a *previously formed structure* with a particle beam. At page 5, lines 20-24 of the specification, the Applicant defines a previously formed structure as one that is *not being added to by a deposition step at the same time that the structure is being contacted by the particle beam such as in an IBAD process*. On the other hand, Mao et al. teaches use of a particle beam in an IBAD deposition process. Hence, Mao et al. teaches a completely different process and use of a particle beam.

To assist with clearly setting forth the distinctions discussed above, the Applicant has amended each of the pending independent claims to recite that at least one step of contacting said structure with an oblique particle beam is not carried out simultaneously with carrying out deposition on said structure. Such amendment is made to all pending claims without the intent to narrow the scope of those claims but to clarify what the Applicant considers to already be stated in the claims.

Based on the foregoing, the Applicant respectfully submits that neither Russo et al. nor Mao et al., which both teach IBAD, do not teach, suggest or provide motivation or incentive for the complete inapposite process recited in the Applicant's claims; namely, contacting a previously formed structure with a particle beam without simultaneous deposition. Accordingly, the rejection of Claims 1 and 20-34 should be withdrawn.

(b) Claims 2-19.

Claims 2-19 were also rejected by the Examiner based on the cited combination of Russo et al. and Mao et al. In response, the Applicant incorporates by reference its arguments above with regard to Claims 1 and 34. Claim 2, which is an independent claim, also recites that a previously formed structure is contacted with an oblique particle beam. Therefore, the arguments above are equally applicable to Claims 2-19 and the rejection of Claims 2-19 should be withdrawn.

(c) Claims 35-42.

As indicated in Section 1 above, the Examiner did not state any grounds for rejection of Claims 35-42. Since Claims 35-38 depend from base claims discussed, above, Claims 35-38 are patentable for the same reasons as their base claims. With regard to Claims 39-42, the Applicant has amended Claim 39 to recite that the structure is a preformed structure consistent with the arguments above. Accordingly, Claims 39-42 are also patentable.

3. Secondary Considerations / Declaration under Rule 132.

Submitted herewith is a Declaration of Les Fritzemeier under 37 CFR 1.132 submitted by the Applicant as further evidence that the present invention, as recited in the pending claims, would not have been obvious to one of ordinary skill in the art in view of the combined teachings of Russo et al. and Mao et al. More particularly, Mr. Fritzemeier who is a non-inventor expert, states that:

(a) Both Russo et al. and Mao et al. teach Ion Beam Assisted Deposition (IBAD) which requires simultaneous deposition and ion bombardment of the film that is being biaxially textured.

(b) In the present invention, however, exposure to the oblique particle beam takes place either before or after, but not during, deposition of the film that is being biaxially textured.

(c) The present invention does not involve formation of the desired crystalline texture during deposition.

(d) More particularly, contrary to the teachings of Russo et al. and Mao et al., in the present invention a previously formed non-single-crystal structure is contacted with an oblique particle beam and at least one step of contacting the structure with the oblique particle beam is not carried out simultaneously with carrying out deposition on the structure.

(e) On page 2692, Mao et al. concludes that "the formation of biaxial alignment is an evolutionally selected growth process," and "about 1000 Å thickness is needed to develop the alignment."

(f) In contrast, the present invention is a processing method that does not involve an evolutionary process during film growth that requires a great thickness.

(g) Mao et al. specifically lists examples of cases in which ion bombardment under their usual parameters does not determine the orientation of the biaxial texture - specifically, when there is an underlying substrate or layer with initial texture. This is described in the last paragraph of page 2689, which concludes on the following page with the statement "the alignment of YSZ films is not controlled by the bombarding ion beam but, instead, epitaxially along the substrate lattice."

(h) In contrast, the method of the present invention induces the desired crystalline texture utilizing an ion bombardment at the top surface, not beginning at an underlying substrate.

(i) One of ordinary skill in the art would not find the present invention to be obvious in view of the cited combination of Russo et al. and Mao et al.

(j) The combined teachings of Russo et al. and Mao et al., which both teach IBAD, do not teach, suggest or provide motivation or incentive invention recited in the Applicant's claims; namely, contacting a previously formed structure with a particle beam without simultaneous deposition.

(k) Russo et al. and Mao et al. teach away from the present invention.

Therefore, the Applicant respectfully submits that the Declaration of Les Fritzemeier provides an additional basis for the Applicant's assertion that the pending claims recite subject matter which is patentable over the combined teachings of Russo et al. and Mao et al.

4. Correction of Typographical Errors.

The specification and Claims 25 and 30 have been amended to correct an incorrect correction of what was believed to be a typographical error where "Ti" was inadvertently presented as "T1". However, it was not "T1" that was specified in the specification originally filed but "TI" (Thallium). Accordingly, the Applicant has amended the specification to the language as originally filed.

5. Conclusion.


In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass

this application to issue.

The Applicant also respectfully requests a telephone interview with the Examiner in the event that there are questions regarding this response, or if the next action on the merits is not an allowance of all pending claims.

Date: 10/21/03

Respectfully submitted,

A handwritten signature in black ink, appearing to read "John P. O'Banion", written over a horizontal line.

John P. O'Banion, Reg. No. 33,201
O'BANION & RITCHEY LLP
400 Capitol Mall, Suite 1550
Sacramento, CA 95814
(916) 498-1010